#80028

CRUISE REPORT

Vessels: R/V LULU, DSRV ALVIN CRUISE 107 Leg 2

Area of operation: Blake Escarpment

Dates: Depart Norfolk, VA 16 October 1980
Arrive Nassau, Bahamas 2 November 1980

Personnel: William Dillon, USGS, Woods Hole, Chief Scientist
Page Valentine, USGS, Woods Hole
Charles Paull, USGS, Woods Hole and SIO
Mahlon Ball, USGS, Woods Hole
Eugene Shinn, USGS, Miami
Michael Arthur, USGS, Denver

Purpose: To observe morphology and sedimentary processes of the Blake Escarpment and sample rocks for age dating and paleoenvironmental determinations.

Navigation: LULU was navigated by Loran C during dives and ALVIN was navigated by range and bearing relative to LULU.

Locations and dives:

A. Dive site A was located at the Blake Spur at approximately 30°10'N, 76°00'W. Dives 1054 through 1057 were made here with 22 sample stations. 4 Dives

B. Dive site B was located at 29°02'N, 76°44'W. Dives 1058 through 1060 were made and 24 sample stations were made. 3 Dives

C. Dive site C was at 28°24'N, 76°38'W. Dives 1061 through 1063 were made and samples were collected at 29 sample stations. 3 Dives

75 Samples 10 Dives

Narrative:

Three continuous transects of the Blake Escarpment, east of Florida, were made during 10 dives with the submersible ALVIN at depths between 1,400 and 4,000m. We observed and sampled outcrops of horizontal strata that are known from multichannel profiles across the dive sites to extend westward beneath the Blake Plateau carbonate platform. The northern end of the Blake Escarpment, at the salient of the Blake Spur is a nearly vertical limestone cliff that is pitted and commonly fluted by vertical borings, coated with ferromanganese oxide, and heavily encrusted by organisms. Presumably, the cliff face is

maintained by bioerosion and corrosion, and debris is removed by the strong, turbulent currents (2 knots). Average slopes were less steep at transects 130 and 200 km south of the Blake Spur, but vertical cliffs as much as 450 m high exist. Talus slopes are common and observation of very large blocks and landward dips of beds suggest collapse of fragments at least several hundreds of meters across. On the southern transect, broad slopes of rippled pteropod sand occur between near-vertical outcrops; a vertical, 160 m cliff of massive limestone at the top of the escarpment and rudists in talus blocks suggest the presence of a Mesozoic reef. Preliminary analysis of calcareous nonnofossils shows rocks as old as Early Cretaceous; identification of older rocks is anticipated. Sedimentary structures and components indicate deposition in shallow water. Thousands of meters of subsidence and extensive erosional retreat were required to create the escarpment's present configuration.